



# BECKMAN INSTITUTE OPEN HOUSE '05



## Program of Exhibits





# BECKMAN INSTITUTE OPEN HOUSE '05



## Program of Exhibits

### 1st Floor Exhibits (continued)

- ☐ **Pores! What Are They Good For?**  
1005 West All Day

When you think of pores, you think of small holes in your skin that allow for transport of materials in and out of the body. Pores are just as important in the development of nanoscale chemical devices.

- ☐ **Making People Disappear**  
1005 East All Day

Experience a striking visual illusion in which a person literally seems to disappear and reappear right in front of your eyes.

- ☐ **Arnold O. Beckman: A Legacy of Discovery**  
1215 All Day

A tribute to the late Arnold O. Beckman which features memorabilia from his remarkable life, including a working pH meter, one of his most famous inventions.

- ☐ **Visualizing Nanodevices at Work**  
1227 On Going Session Between: 10:00 – 2:00

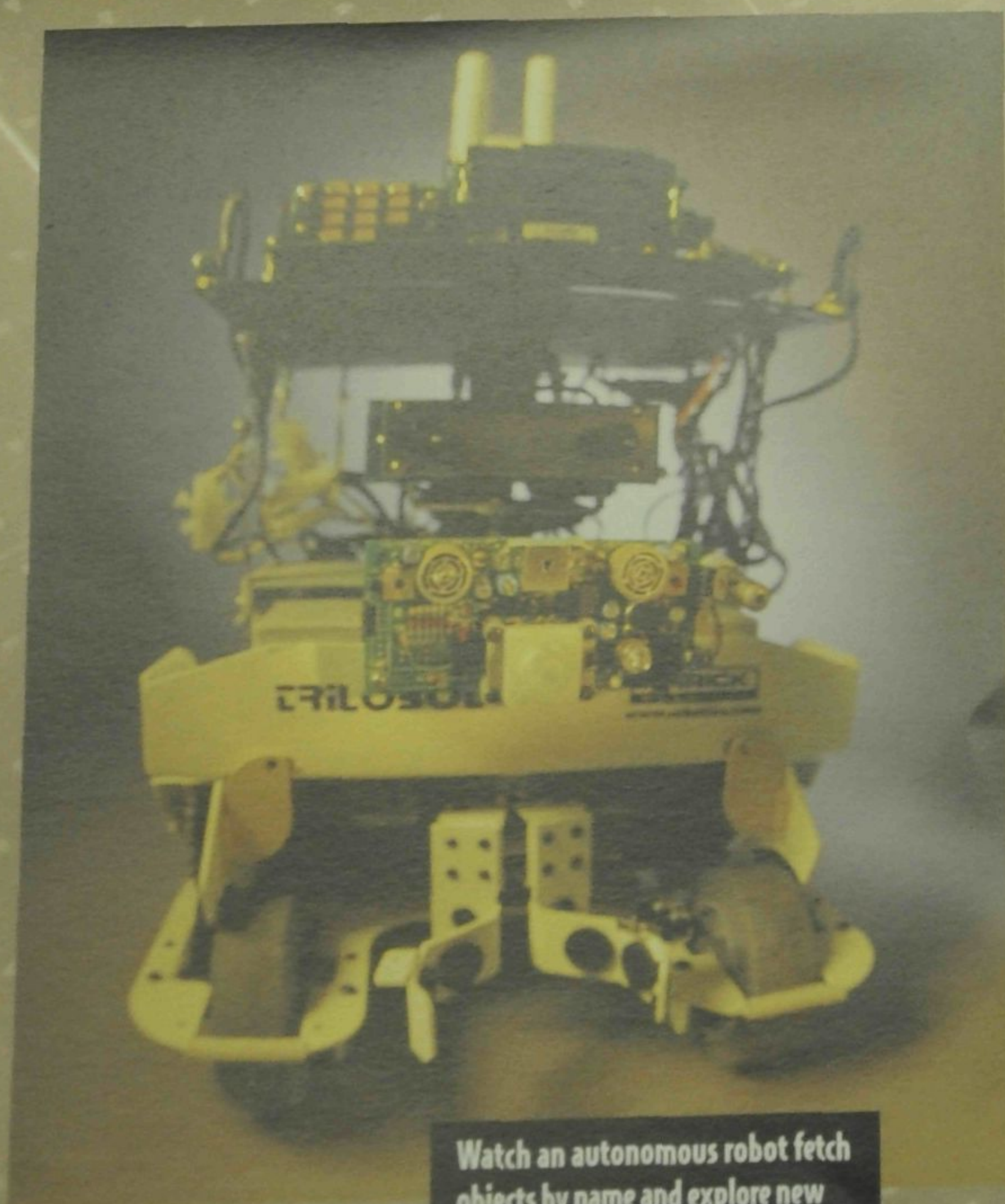
Participants will see 3-D images and animations of nanostructures, such as passage of DNA molecules through nanopores, how water molecules fill nanotubes, and how lipid molecules can be clustered in nanometer-sized discs.

- ☐ **The Self-Aiming Camera Has Its Eye on You**  
1237 All Day

The self-aiming camera (SAC) is a movable video camera that aims itself at people and other items of interest in its environment. Its design is based on a computer model of the superior colliculus (a region of the brain). SAC intelligently fuses input from multiple sensors to decide which direction to aim itself.

- ☐ **Detecting...Um...Disfluency in Automatic Speech Recognition**  
1420 Hourly

Humans are able to comprehend speech easily despite the frequent occurrence of disfluency. Listeners often do not notice the pauses—"Ums and Ahs"—that pepper ordinary speech, and they are equally forgiving of the many errors, false starts and repairs that speakers often produce. Our presentation will include demonstrations of the kinds of speech disfluency found in our corpus of conversational speech, and of the computer systems we use to analyze the acoustic speech signal. Visitors will be able to record their own speech and see their "voiceprints" using digital spectrography for speech.



Watch an autonomous robot fetch objects by name and explore new environments. Room 1510

### 1st Floor Exhibits

- ☐ **Imaging Technology Group (ITG) Visualization, Media, and Imaging Lab**  
East Atrium All Day

The VMIL exhibit will include a color 3-D printer, a virtual scanning electron microscope, volumetric visualization of CT, MRI, and Micro-CT, and information about the Mandible Reconstruction Project. Staff will be available to answer questions.

- ☐ **Biomedical Imaging Center (BIC)**  
Center Atrium, West All Day

As researchers discover the incredible potential of magnetic resonance imaging, BIC stands out with its unique capabilities in this expanding field. In addition to medical applications, the imaging machines at BIC have supported research areas as diverse as environmental science, engineering, psychology, biology, and neuroscience. They have been used to scan everything from soil samples to the spinal cords of mice.

- ☐ **Circuits By the Mile and More: Applications of Soft Lithography**  
Center Atrium, East All Day

From wallpaper video screens to solar cell arrays that roll out like carpet, new plastic electronic technologies are the way of the future.

- ☐ **ImmersaDesk**  
1003 All Day

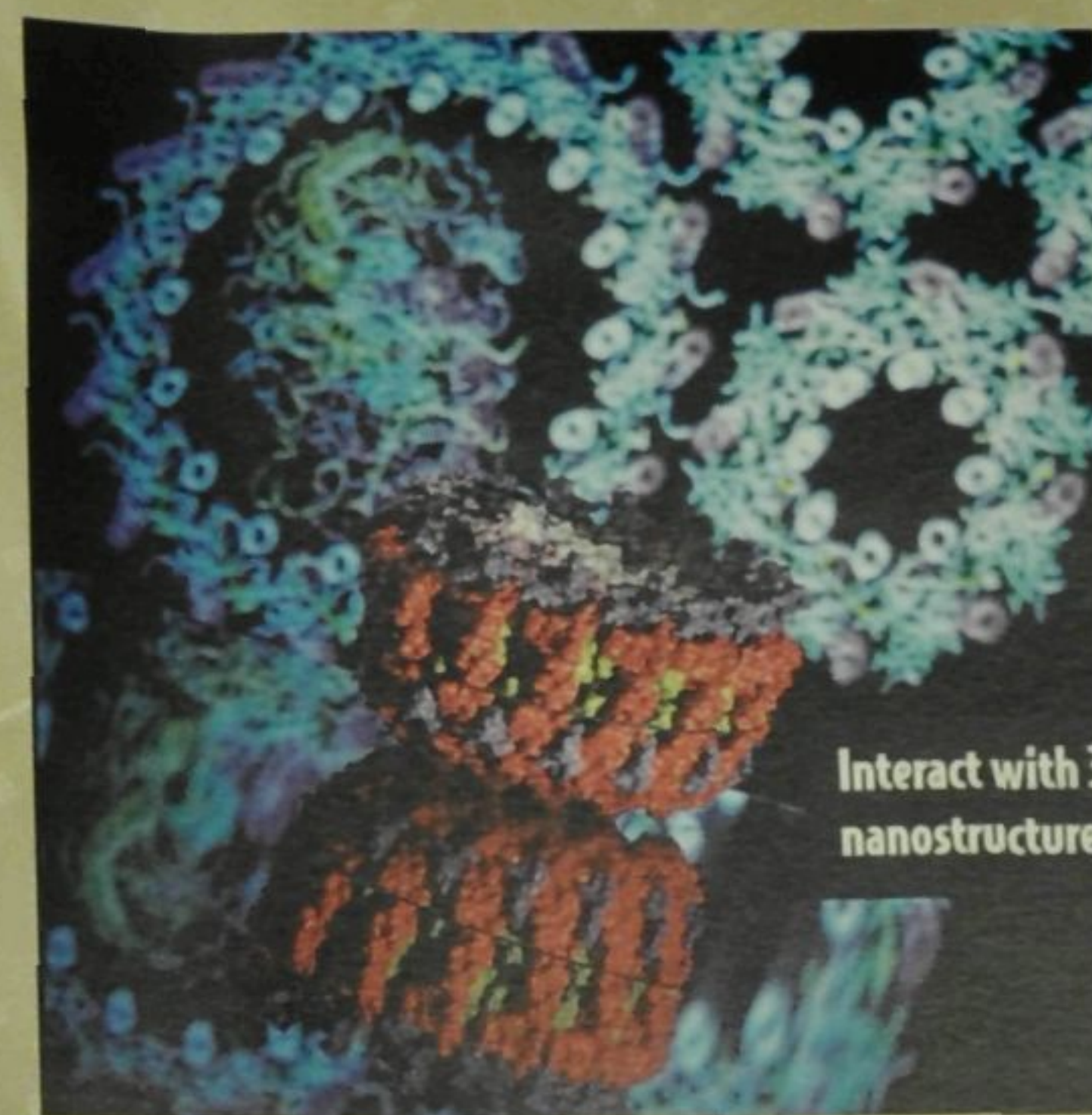
Couldn't get tickets for the CAVE™? Try the ImmersaDesk, a one-walled portable version of the fully immersive CUBE™.

- ☐ **An Evil Smile: A 3-D Animated Face for Studying Emotional Expressions**  
1005 West All Day

How well can you make an evil smile? A knowing smile? Can you tell the difference between a true smile of happiness and a social smile? Every day we use emotional expressions to communicate how we feel and gauge how others feel about us. See an animated 3-D face controlled with a joystick to study expressions.

- ☐ **Brain on a Chip: Biological Neural Network on a Dish**  
1005 West All Day

Look at a biological neural network under a microscope.



Interact with 3-D images and animations of nanostructures. Room 1227



Learn about Arnold O. Beckman, a great man of science and humanity. Room 1215



See the 3-D printer sculpt an array of programmed shapes that spark the imagination. East Atrium

### 1st Floor Exhibits (continued)

- ☐ **Autonomous Robotic Learning of Object Names**  
1510 Friday: 9:00, 11:00, 1:00, 3:00 Saturday: 10:00, 12:00, 2:00

An autonomous robot will find objects it has learned names for and explore its environment to learn about new objects.

- ☐ **Computer Vision and Robotics Lab**  
1532 All Day

Come and see computers that can:

- Analyze moving trains to prevent derailments and save fuel
- See the world through a hemispherical camera
- Verify video evidence—Can it be trusted?
- Detect forest fires in video sequences
- Produce 3-D graphic models from the reflections of objects

- ☐ **The Psychology of Luggage Screening**  
1612 All Day

Participate in a simulated luggage screening task and see a demonstration of eye movement recording techniques used to study the psychology of screening.

- ☐ **The Productive Aging Lab**  
1624, 1632 All Day

A demonstration of behavioral/memory tasks and of fMRI brain analysis will be shown, as well as other behavioral and fMRI projects being conducted in our lab.

- ☐ **Colorimetric Lead Detection with Catalytic DNA**  
1710 Hourly

Watch a lead detection kit sensor based on gold nanoparticles assembled by catalytic DNA change from purple to red when lead is added.

- ☐ **Image Under the Skin**  
1736 On the Half Hour

Scan your finger using an optical cross-sectional imaging system. Other specimens may be imaged as well to show micron-scale biological features.



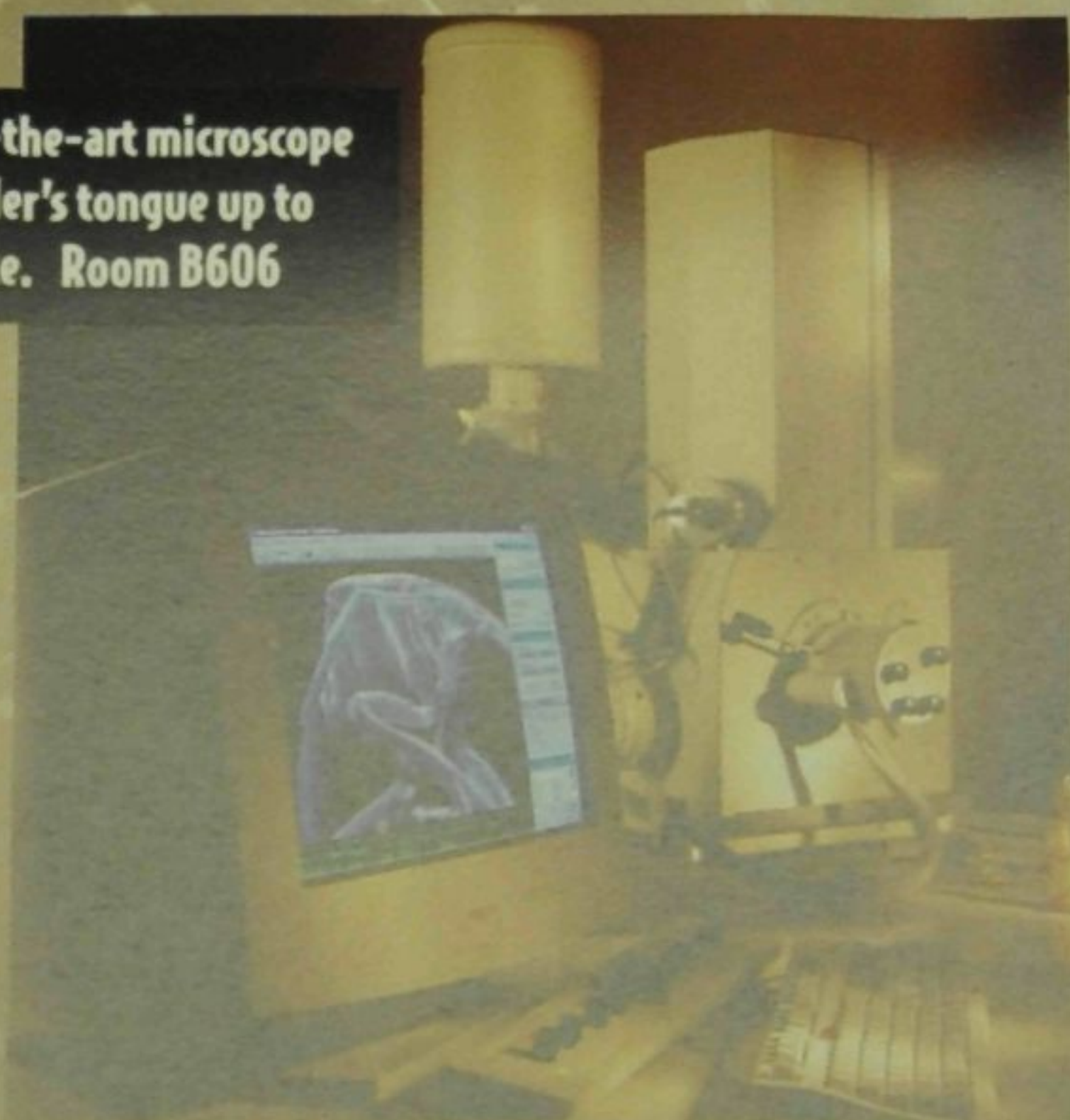


# BECKMAN INSTITUTE OPEN HOUSE '05 Program of Exhibits

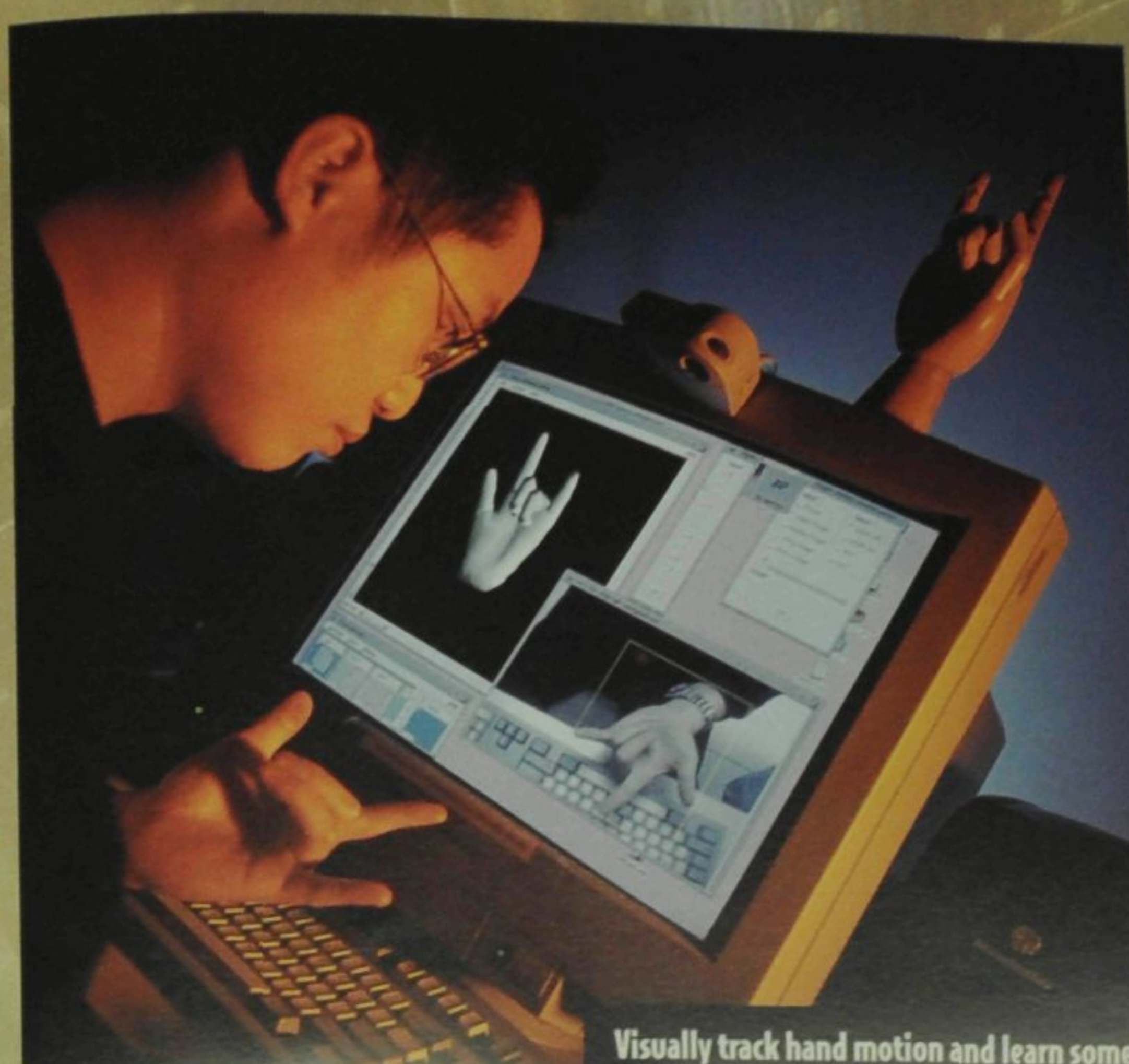
## 2nd Floor Exhibits

- ☐ **Visual Face Tracking and Expression Recognition**  
2nd Floor Bridge Hourly  
Come see how the computer interprets human facial movements.
- ☐ **3-D Face Model Reconstruction From a Single Image**  
2nd Floor Bridge Hourly  
Reconstruct a personalized face based on one single face image.
- ☐ **Human Speech Perception**  
2137 All Day  
Audio demonstrations and posters describe research attempting to reverse engineer human speech recognition. Resulting research is used in hearing aid design, cochlear implant design, and automatic speech recognition.
- ☐ **Control a PC with Your Bare Hands: 2-D Hand Tracking-Based User Interface**  
2203 Friday: 10:00, 1:00, 2:00, 4:00 Saturday: 10:00, 12:00, 2:00  
By visually tracking the hand motion from the video input of a webcam, we will demonstrate some interesting applications of intelligent human-computer interaction. Draw on the screen with a fingertip to play rock, scissors, paper, and to navigate a 3-D virtual terrain generated with computer graphics.
- ☐ **Multimodal Human-Computer Interaction: Toward an Interactive Computer**  
2203 All Day  
Ever wonder what it would be like if a computer could know what you are doing and how you are feeling and offer useful help just as you need it? This project uses computer vision, eye-tracking, prosodic feature analysis, speech recognition, synthetic speech, 3-D avatars, and computer learning to help students learn math and science concepts through the exploration of Lego gears.
- ☐ **The Amazing Changing Brain**  
2269 All Day  
Posters and videos will describe the lab's current research in the areas of Fragile X Mental Retardation, Fetal Alcohol Syndrome, schizophrenia, exercise-induced changes in the brain, and the neurobiology of learning and memory.
- ☐ **The Intelligent Hearing Aid**  
2269 All Day  
Current hearing aids are designed to improve a listener's ability to hear sound. However, their efficacy for improvement in speech understanding in noisy listening environments is limited. Using information processing principles in biological systems as a guide, researchers have developed new technologies that can effectively extract a signal in the presence of multiple background sounds.
- ☐ **Making Team Players Out of People and Automation**  
2414 10:00 a.m. - 3:00 p.m.  
Interactive games show how this research seeks to enhance the coupling between people and automation. A computer-generated model 'flies' a flight simulator to test advanced concepts for cockpit display design.
- ☐ **Shedding Light on the Brain**  
2420 & 2434 On the Half Hour  
Visitors will receive an introduction to brain function and observe how EROS, a new and safe technique, uses near-infrared light to measure brain activity.
- ☐ **Electrophysiology of Language**  
2438 All Day  
Get a sense of how electrophysiological data is collected and processed and learn about the type of brain activity associated with comprehending words and sentences.
- ☐ **The Building Blocks of the Brain**  
2510 Hourly  
Neurons are the building blocks of the nervous system and communicate with each other through an elaborate system of electrical and chemical signals. See how neurophysiologists monitor neuron activity using modern electrophysiological techniques.

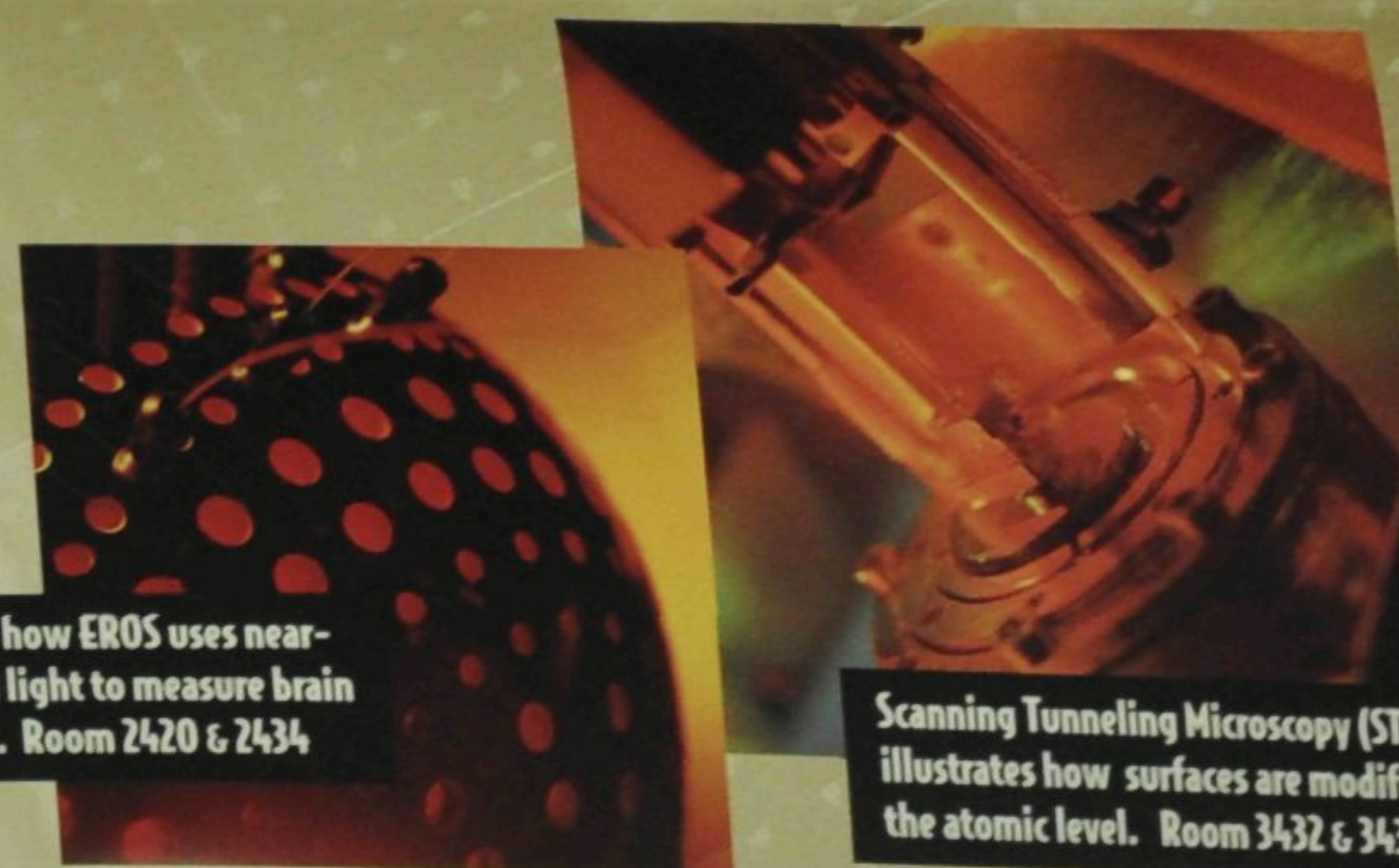
Learn about a state-of-the-art microscope that can magnify a spider's tongue up to 10,000x its original size. Room B606



Take a test drive in the Driving Simulator used in perceptual psychology research. Room B668



Visually track hand motion and learn some interesting facts about intelligent human-computer interaction. Room 2203



Observe how EROS uses near-infrared light to measure brain activity. Room 2420 & 2434

Scanning Tunneling Microscopy (STM) illustrates how surfaces are modified at the atomic level. Room 3432 & 3434

## 3rd Floor Exhibits

- ☐ **Fluid Transport at One Billionth of a Meter**  
3203 Hourly  
Fluid transport at the nanometer scale (nanofluidic transport) is a fascinating topic that is fundamental to many important biological and engineering applications.
- ☐ **Scanning Tunneling Microscopy**  
3432 & 3534 All Day  
This exhibit demonstrates the capabilities of Beckman's scanning tunneling microscope (STM) through live experiments and examples of past results. The STM allows the direct visualization of atoms on surfaces and, as will be demonstrated, can be used to modify surfaces at the atomic level.
- ☐ **Optical Tweezing**  
3436 All Day  
Produce a single-beam optical trap by focusing an intense laser beam through a high numerical aperture lens.
- ☐ **CAVE™**  
3510 On the Half Hour  
Challenge your imagination while you explore virtual worlds in the CAVE™. Tickets required.
- ☐ **Locating Damage in Color-Changing Plastics**  
3712 9:00, 12:00, 3:00  
Current methods used to detect cracks and failures in plastics used in automobile parts and other structural components are expensive and time-consuming. Researchers in the lab are developing an additive that will change color when this damage has occurred. The exhibit will provide a simple demonstration and explanation of this color-changing phenomenon during hammer impact.
- ☐ **Self-Healing Polymers**  
3736 Hourly  
Inspired by biological systems in which damage triggers an autonomic healing response, we will show visitors a polymer composite material that can heal itself.

## Lower Level

- ☐ **Flight Simulation Lab**  
B604 Every Half Hour  
Come fly in the Beckman Institute's Flight Simulation Lab. The cockpit simulator was manufactured by Frasca International and the visual out-the-window scene is created by three Evans and Sutherland SimFusion systems.
- ☐ **Imaging Technology Group Microscopy Suite**  
B606 All Day  
An overview of the Imaging Technology Group's Microscopy Suite will include demonstrations of imaging at the micron and atomic scale using an Atomic Force Microscope. Learn about the Bugscope Project, which provides classrooms worldwide remote access to the Suite's scanning electron microscope.
- ☐ **Beckman Institute Driving Simulator**  
B668 All Day  
Test drive a vehicle used in perceptual psychology research into improving the safety of the driving experience.